

# Update on Ozone Modeling of Northeast Texas for May-June 2005

Presentation to the NETAC  
Technical Committee

March 28, 2008

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# Background

- Use modeling to improve understanding of conditions leading to high 8-hour ozone concentrations in NE Texas
- Focus on 2005 high ozone days at Longview
- Model can be used to project future design values and evaluate control strategies

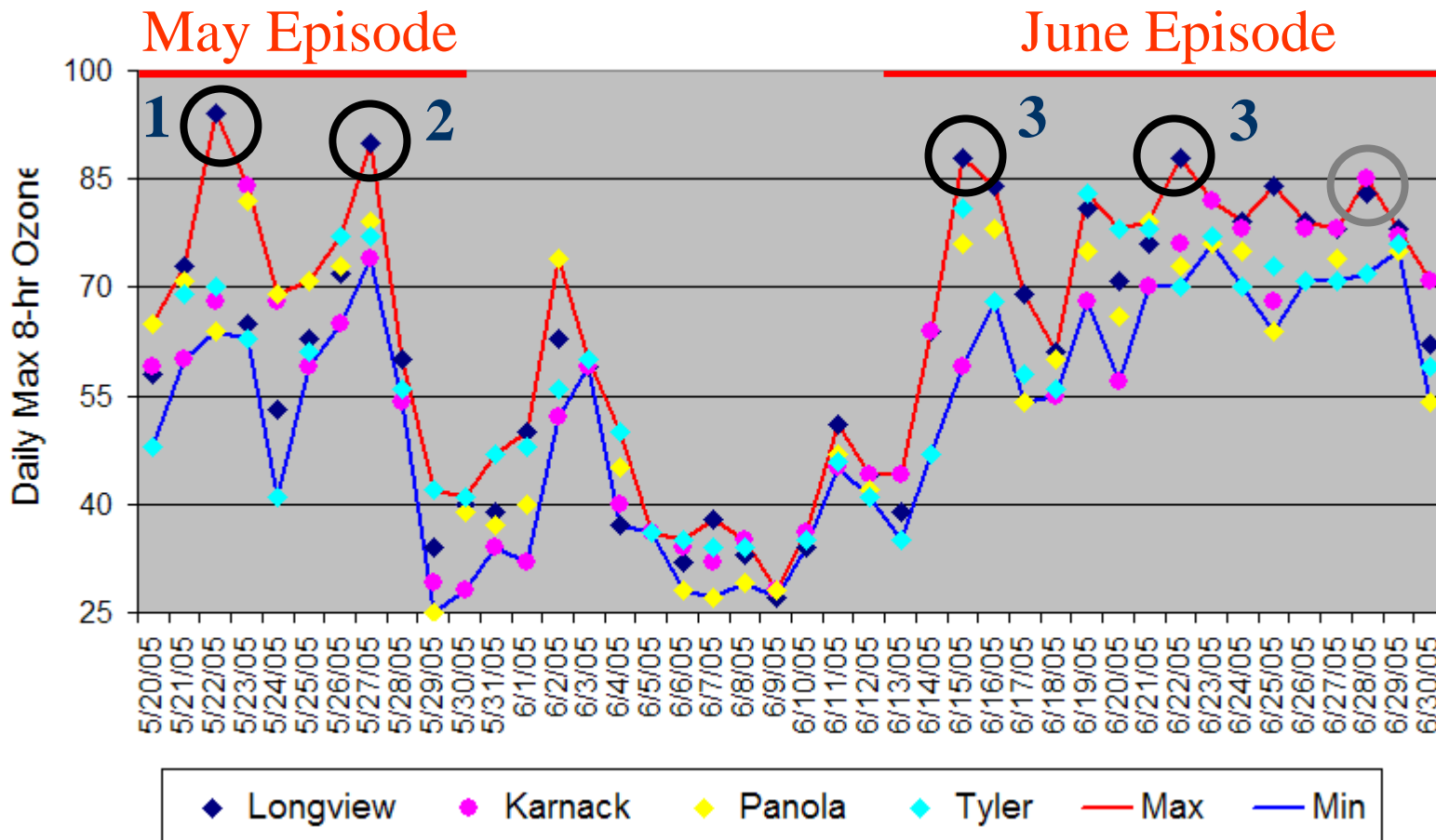
# Status as of Last TC Meeting

- Initial run completed using draft emissions
- Model performed reasonably well
- Tendency to underpredict peak ozone on the high ozone days at Longview
  - Underestimate of regional background ozone and ozone contribution of local sources

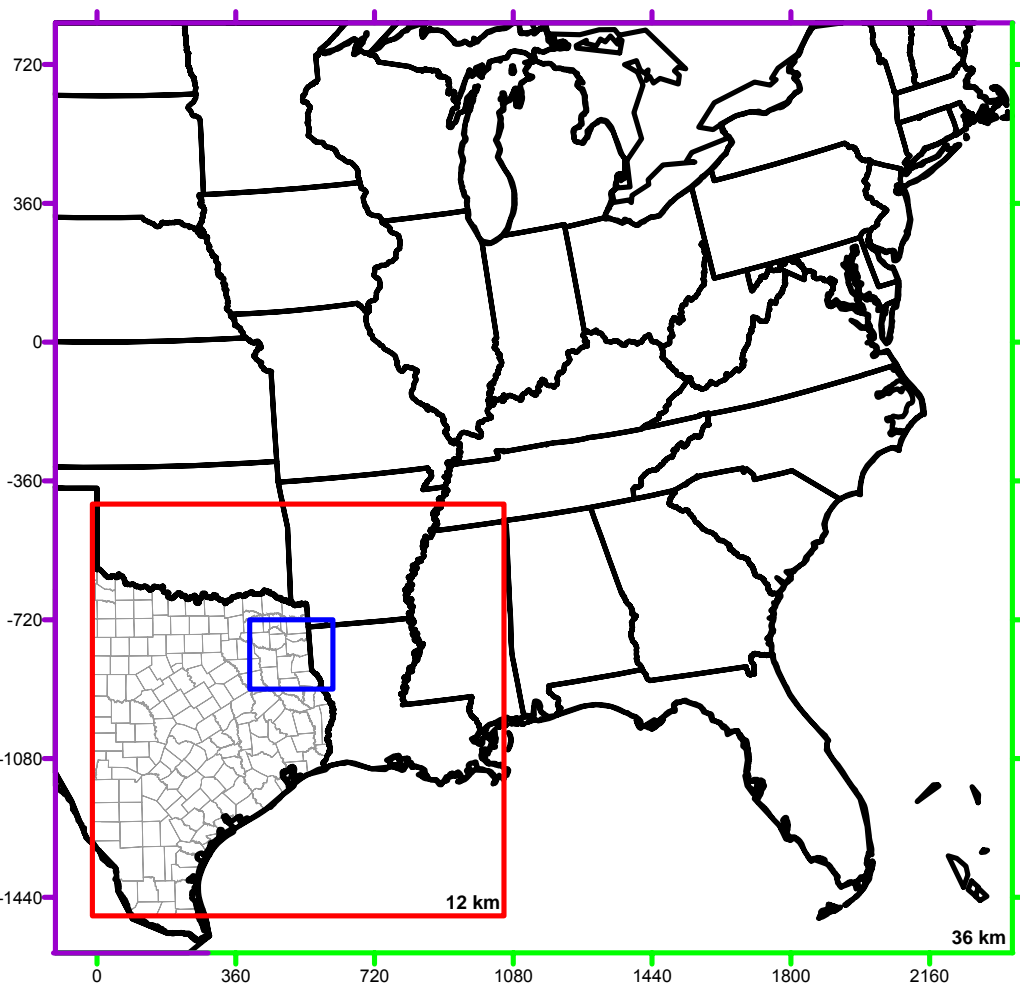
# Recent Work: Developing Model Components

- Integrated TCEQ's new point source and on-road mobile source inventory for 2005.
  - Hourly CEM data for entire May-June period for large NO<sub>x</sub> sources
- Tested new ozone deposition scheme
  - Affects simulation of regional background
  - ~5 ppb more ozone on days with E/NE winds
- Incorporated new CB05 chemical mechanism
  - Revised biogenic emissions model GloBEIS to use CB05

# Modeling Period: May-June 2005



# 2005 CAMx Ozone Modeling Domain

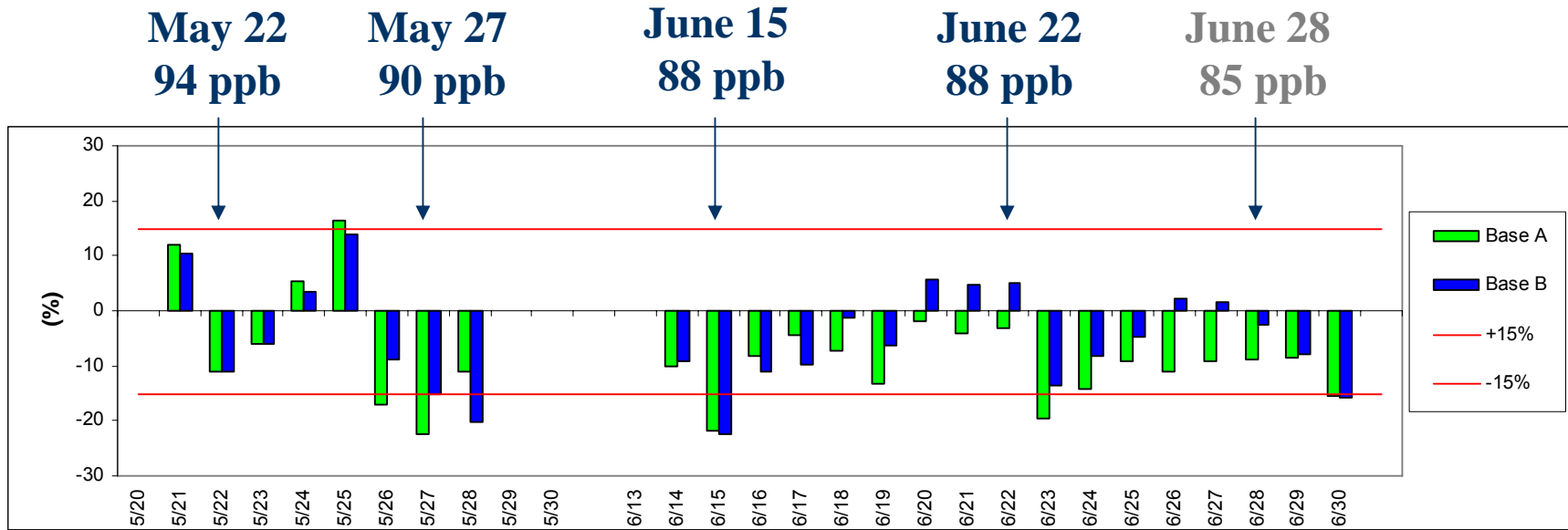


- 36 km/12 km/4 km nested grids in CAMx
- MM5 meteorology
- Draft 2005 Emissions
- Model period May 20-June 30, 2005

# CAMx Model Performance Evaluation

- Compare 2005 model predictions on 4 km grid with observed ozone and precursors from CAMS monitors
  - Longview, Tyler, and Karnack
- Statistics give overview of performance
- Hourly ozone time series to diagnose model performance issues

# Normalized Bias On Each Day



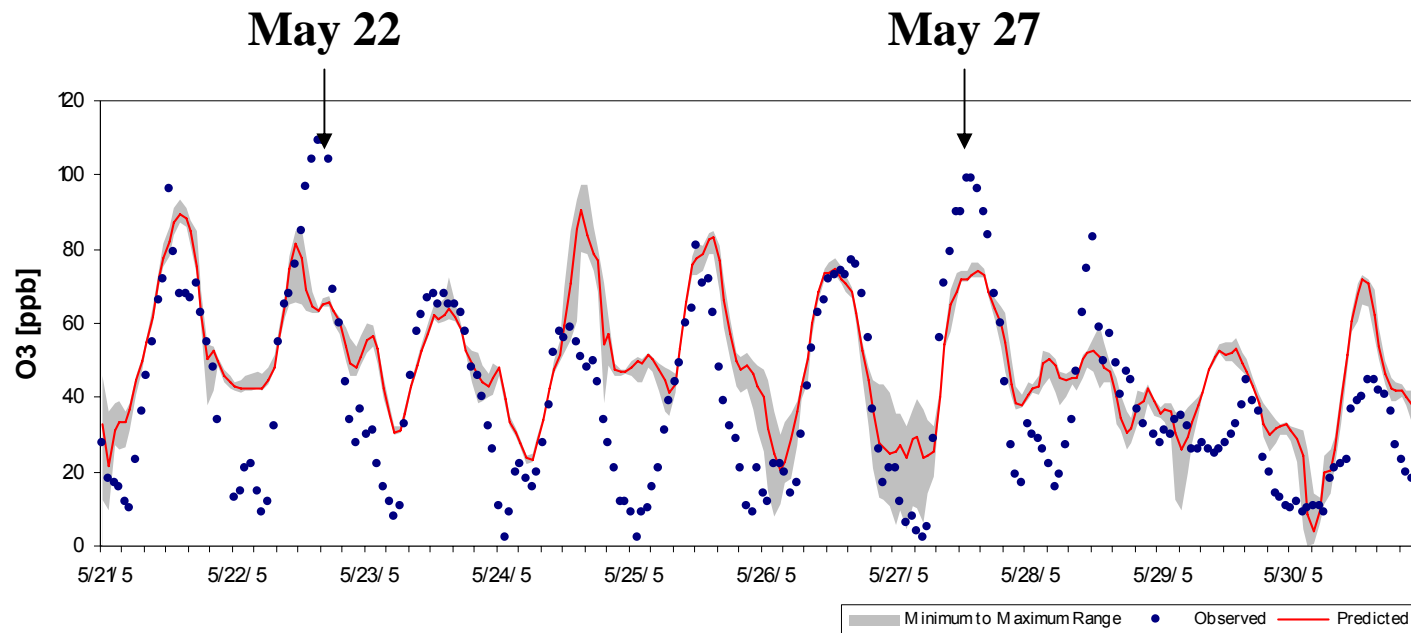
- Dates above chart show high 8-hour ozone days
- Shorter bar means smaller bias i.e. better performance
- Green (Base A) is initial run, blue (Base B) is current run
- Model is within  $\pm 15\%$  benchmarks on 22 of 25 high days
- Overall low bias-generally smaller in the Base B run.

# Model Performance Summary

	Peak 8-Hour Ozone at Longview, Tyler, and Karnack		
	O3 ≥ 85 ppb	85 ppb > O3 ≥ 70 ppb	70 ppb > O3 ≥ 60 ppb
# of Days	5	14	6
# of Days with Low Bias > 10%	3 of 5	4 of 14	2 of 6
MM5 Wind from E/NE Previous Day	4 of 5	3 of 14	1 of 6

- Model underprediction most pronounced on high (>85 ppb) ozone days when
  - Winds are stagnant and wind direction shifts during the day
  - Wind was from E/NE on the previous day

# Longview Hourly Surface Layer Ozone Time Series



- May 22: Model captures wind shift, but Martin Lake plume sweeps across CAMS 19 too early, and ozone in plume is not high enough. Wind speed too high in the morning.
- May 27: Regional ozone ok, plumes pass on either side of CAMS 19. Ozone underestimated in these plumes.



# Summary

- Model performing reasonably well across the two month period
- Need to improve performance on high ozone days for model to be used in control strategy development
- On high ozone days,
  - Regional background ozone is well-simulated
  - Ozone contribution of local sources is underestimated

# Plan for Improving Model Performance

- What are the factors contributing to underestimate of local ozone on high days?
  - Evaluate MM5 simulation of mixed layer depths
    - If mixed layer is too deep, ozone concentrations will be low
    - Perform CAMx sensitivity tests with reduced mixed layer depth
  - Consider new MM5 run
    - Use CAMS winds for nudging. Calm (<3 knot) wind periods are omitted from current ds472 data set.
    - Incorporate new, quality-assured profiler data from TCEQ
  - Test model sensitivity to local emission sources (points, mobile, gas compressors, etc.)
- Continue to develop emission inventory
  - Incorporate TCEQ 2005 area and non-road mobile source inventories
  - Local emission improvements
    - Improve spatial distribution of gas compressor engines and biogenic emissions

End